

PS 1: Unix/Linux & Shell Commands



CMPE 230 - Spring 2024

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Based on the slides by Abdullatif Köksal and Rıza Özçelik, with their permissions.

whoami

- BOUN CMPE BS, MS
- PhD candidate
- Research interests
 - Natural Language Processing
 - Bioinformatics



Channels

- Piazza
 - Materials/Slides
 - Discussions
- Moodle
 - Project Submissions
- 2 TAs, 3 STAs
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Projects

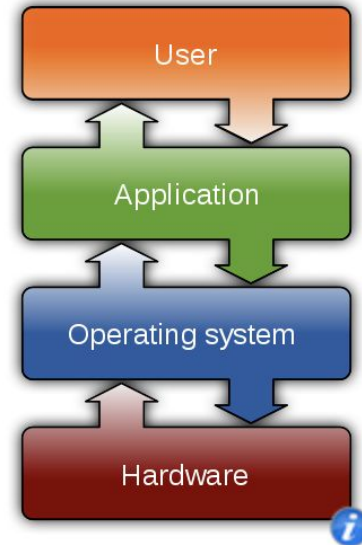
- 3 programming projects
 - C
 - Assembly
 - QT
- Done in groups of two people
- Autograded

Bonus Quizzes

- 4-5 quizzes
 - Unix
 - C
 - Assembly
 - C++

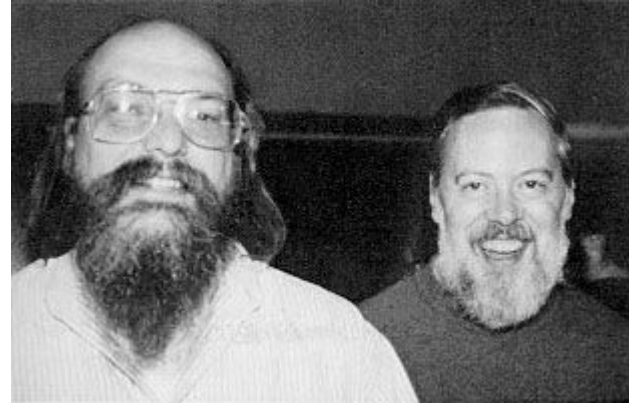
Operating Systems

- An operating system (OS) is system software that manages computer hardware, software resources, and provides common services for computer programs.
- Microsoft Windows
- MacOS (Unix based)
- Ubuntu (Unix based)
- Android (Unix based)



Unix History

- 1960s
- Multitasking and multiuser.
- Written in Assembly and C.
- Today, we use **UNIX** to refer **OS family**, not just a single one OS.



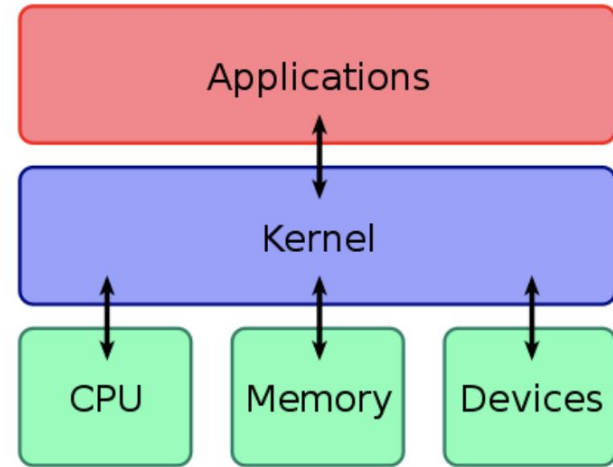
Linux

- **Free-software Unix-like** system.
- In 1991, Linus Torvalds released **the Linux kernel** as a free software.

What is kernel?

Foundation of the operating system.

- It allocates time and memory to programs
- Handles the file store and communications in response to system calls



A kernel connects the application software to the hardware of a computer.

Linux

- **Free-software Unix-like** system.
- In 1991, Linus Torvalds released **the Linux kernel** as free software.
- [Linux distributions](#), consisting of the Linux kernel and large collections of compatible software have become popular both with individual users and in business.

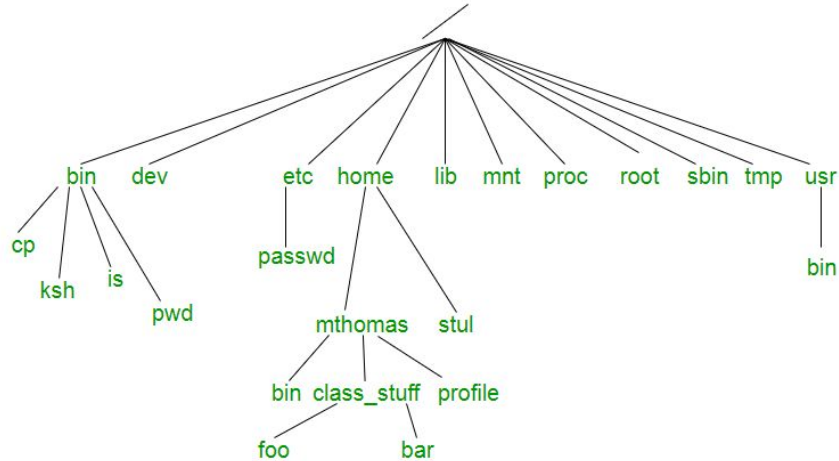
Examples:

[Red Hat Enterprise Linux](#), [Fedora](#), [SUSE Linux Enterprise](#), [openSUSE](#), [Debian GNU/Linux](#), [Ubuntu](#), [Linux Mint](#), [Mandriva Linux](#), [Slackware Linux](#), [Arch Linux](#) and [Gentoo](#).

Linux Directory Structure

Linux directory structure is like a tree.

- Directory structure begins with root /



Shell

- Interface between the user and the kernel.
- The shell is a **command line interpreter** (CLI). It translated human-written commands into computer programs
- The commands are **programs**: when they terminate, the shell gives the user another prompt.

Unix Commands

- **cd <dir>**
 - Change current directory to <dir>
- In Linux
 - . means current directory
 - .. means the parent of the current directory
 - ~ means home directory
- **cd ..**
 - Will go up to the parent directory
 - cd with no option returns to the home directory
- **pwd**
 - Print working directory

Exercise 1: What would these commands do?

- cd ~
- ls ~/..

Unix Commands

- **man <command>**
 - Display the description and options of <command>, i.e. its manual
- **mkdir <dir>**
 - Makes a directory under current directory

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Exercise 2

Create a directory under your home directory and name it **cmpe230**. Inside **cmpe230** create another directory **ps1**. Can you find a way to create these folders with a single command?

Unix Commands

- **man <command>**
 - Display the description and options of <command>, i.e. its manual
- **mkdir <dir>**
 - Makes a directory under current directory
- **ls**
 - List contents of the directory
 - Files beginning with a dot (.) are known as hidden files and they are not shown
 - `ls <dir>` displays content of a given directory.
- **ls -a**
 - Lists all files including the hidden files
- **ls -lRrt**
 - Lists all files detailed including subdirectories reverse time modified

Unix Commands

- **touch <filename>**
 - Creates <filename> as a file
- **cp <file1> <file2>**
 - Makes a copy of <file1> named <file2>
- **mv <file1> <dir>**
 - Moves <file1> to the directory <dir>
 - Can be used for file renaming!
- You can edit files within the terminal, too!
 - **nano**
 - **vim**

Unix Commands

- **cat <filename>**
 - Display all file content
- **head <filename>**
 - Display the beginning of the file
 - Use -n option to specify the number of lines to display
- **tail <filename> <dir>**
 - Display the end of the file
 - Use -n option to specify the number of lines to display
 - Use -f option to track the content!

Unix Commands

Exercise 3:

1. Open a new terminal and create code `.c`
2. Open the file with `nano` and write the program to print “Hello, World!”
3. Move the file from current directory to `ps1`
4. Rename the file to `hello.c`
5. Compile and run the file.

Congrats! You have just written a script using only the shell!

Unix Commands

- **rm <file>**
 - Removes a file from the disk
- **rmdir <directory> or rm -d <directory>**
 - Removes **empty** directory
- **rm -r <directory>**
 - Removes a **non-empty** directory and all the files inside (recursively).
 - If a directory or a file in the directory is write-protected, you will be prompted to confirm the deletion.
- **rm -rf <directory>**
 - Removes a non-empty directory and all the files within them without prompting e.g. forces deletion.

Unix Commands

- **clear**
 - Clears the terminal screen.
- **grep <keyword> <textfile>**
 - Searches a keyword in a textfile
 - use -i to ignore case in keyword
 - Fast and flexible
- **wc <file>**
 - Computes statistics of file such as word count, number of lines etc.
 - Use man to learn more!

Unix Commands

- Commands are taken from standard input (stdin) and output to standard output (stdout)
- By default, standard input is connected to the terminal keyboard and standard output and error to the terminal screen.
- You can redirect to stdin, stdout and other commands (pipe).

>	Redirect stdout
<	Redirect stdin
>>	Append standard output
	Redirect standard output to another command (pipe)

pipes

JULIA EVANS
@b0rk

Sometimes you want to send
the output of one process
to the input of another

```
$ ls | wc -l
```

53

↗ 53 files!

Unix Commands

- **cat:** short for concatenate
- **cat > TS.txt**
 - Type the list of your favorite Turkish sitcoms
 - Ctrl+C to exit
- Read the contents with cat
- **cat > nTS.txt**
 - Type the list of your favorite non-Turkish sitcoms
- **cat TS.txt nTS.txt > S.txt**
- **cat S.txt**
- **cat >> S.txt**
 - Add any sitcom

Unix Commands

- **sort**
 - Alphabetically and numerically sorts a file

Exercise 4

- Sort `S.txt` and write its output to a file named `sorted.txt`
- Sort `S.txt` and write its lines that contain "t" to `filtered.txt`

Unix Commands

Wildcards

- * is called a wildcard, and will match against none or more character(s) in a file (or directory) name.
- * can be combined with almost all the commands.
- **ls *.txt**
 - List all the files that end with .txt
- ? is similar to * but it will match only one character.
- **ls ?ouse**
 - Match files like house, mouse but not grouse

Quiz Time!

- Download folder including files with animals by executing the following:
 - **wget** <https://gokceuludogan.github.io/animals.zip>
- Extract files
 - **unzip animals.zip**
- Each file contains a set of dogs and cats

```
cmpe230@cmpe230-VirtualBox:~/quiz/animals$ ls
0.txt 1.txt 2.txt 3.txt 4.txt 5.txt 6.txt 7.txt 8.txt
cmpe230@cmpe230-VirtualBox:~/quiz/animals$ cat 8.txt
```

Exercise: Display files with dogs on the screen

- Step 1: Check whether a file contains at least one dog
Hint: `o` is unique to dogs
- Step 2: Find name of the files having dogs

Fun Commands

sudo apt-get install <package-name>

- **fortune**
- **cmatrix**
- **sl**
- **cowsay**
- **xcowsay**